# PART3　定積分の性質

**例題**

次の定積分を求めよ。

(1) $\displaystyle\int_{-1}^{1}(-x^2+2x)dx+\int_{1}^{2}(-x^2+2x)dx$

(2) $\displaystyle\int_{-2}^{0}(-x^3+3x^2-4x+2)dx-\int_{2}^{0}(-x^3+3x^2-4x+2)dx$

**Point Pickup**

**練習**

次の定積分を求めよ。

(1) $\int_{-2}^{3}(2x^2-1)dx+\int_{3}^{1}(2x^2-1)dx$

(2) $\int_{-1}^{0}(4x^3-x^2+2x-1)dx-\int_{1}^{0}(4x^3-x^2+2x-1)dx$

# 第17講　PART3 確認問題

次の定積分を求めよ。

**1** $\int_{-1}^{2}(3x^2-1)dx+\int_{2}^{3}(3x^2-1)dx=$ [アイ]

**2** $\int_{-2}^{0}(4x^3+3x^2-x+1)dx-\int_{2}^{0}(4x^3+3x^2-x+1)dx$

$=$ [ウエ]

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**例題**

次の定積分を求めよ。

(1) $\displaystyle\int_{-1}^{1}(-x^2+2x)dx+\int_{1}^{2}(-x^2+2x)dx$

(2) $\displaystyle\int_{-2}^{0}(-x^3+3x^2-4x+2)dx-\int_{2}^{0}(-x^3+3x^2-4x+2)dx$

(1) $$\int_{-1}^{1}(-x^2+2x)dx+\int_{1}^{2}(-x^2+2x)dx=\int_{-1}^{2}(-x^2+2x)dx=\left[-\frac{1}{3}x^3+x^2\right]_{-1}^{2}$$

$$=-\frac{1}{3}\{8-(-1)\}+(4-1)=-3+3=0$$

(2) $$\int_{-2}^{0}(-x^3+3x^2-4x+2)dx-\int_{2}^{0}(-x^3+3x^2-4x+2)dx$$

$$=\int_{-2}^{0}(-x^3+3x^2-4x+2)dx+\int_{0}^{2}(-x^3+3x^2-4x+2)dx$$

$$=\int_{-2}^{2}(-x^3+3x^2-4x+2)dx$$

$$=2\int_{0}^{2}(3x^2+2)dx=2\left[x^3+2x\right]_{0}^{2}=2\{(8+4)-(0+0)\}=24$$

**練習**

次の定積分を求めよ。

(1) $\displaystyle\int_{-2}^{3}(2x^2-1)dx+\int_{3}^{1}(2x^2-1)dx$

(2) $\displaystyle\int_{-1}^{0}(4x^3-x^2+2x-1)dx-\int_{1}^{0}(4x^3-x^2+2x-1)dx$

(1) $\displaystyle\int_{-2}^{3}(2x^2-1)dx+\int_{3}^{1}(2x^2-1)dx=\int_{-2}^{1}(2x^2-1)dx=\left[\frac{2}{3}x^3-x\right]_{-2}^{1}$

$\displaystyle=\frac{2}{3}\{1-(-8)\}-\{1-(-2)\}=6-3=3$

(2) $\displaystyle\int_{-1}^{0}(4x^3-x^2+2x-1)dx-\int_{1}^{0}(4x^3-x^2+2x-1)dx$

$\displaystyle=\int_{-1}^{0}(4x^3-x^2+2x-1)dx+\int_{0}^{1}(4x^3-x^2+2x-1)dx$

$\displaystyle=\int_{-1}^{1}(4x^3-x^2+2x-1)dx$

$\displaystyle=2\int_{0}^{1}(-x^2-1)dx=2\left[-\frac{1}{3}x^3-x\right]_{0}^{1}=2\left\{\left(-\frac{1}{3}-1\right)-(0-0)\right\}=-\frac{8}{3}$

# 第17講　PART3 確認問題 解答

## 1

**[正解]** アイ：24

**[解説]**

$$\int_{-1}^{2}(3x^2-1)dx+\int_{2}^{3}(3x^2-1)dx$$

$$=\int_{-1}^{3}(3x^2-1)dx \quad \text{[A]}$$

$$=\Big[x^3-x\Big]_{-1}^{3}$$

$$=(27-3)-\{-1-(-1)\}$$

$$=24-0$$

$$=\mathbf{24}$$

[A]　$\displaystyle\int_a^b f(x)dx$

$\displaystyle =\int_a^c f(x)dx+\int_c^b f(x)dx$

## 2

**[正解]** ウエ：20

**[解説]**

$$\int_{-2}^{0}(4x^3+3x^2-x+1)dx$$

$$-\int_{2}^{0}(4x^3+3x^2-x+1)dx$$

$$=\int_{-2}^{0}(4x^3+3x^2-x+1)dx$$

$$+\int_{0}^{2}(4x^3+3x^2-x+1)dx \quad \text{[B]}$$

$$=\int_{-2}^{2}(4x^3+3x^2-x+1)dx$$

$$=2\int_{0}^{2}(3x^2+1)dx \quad \text{[C]}$$

$$=2\Big[x^3+x\Big]_{0}^{2}$$

$$=2\{(8+2)-(0+0)\}$$

$$=\mathbf{20}$$

[B]　$\displaystyle\int_a^b f(x)dx=-\int_b^a f(x)dx$

$\displaystyle\int_a^b f(x)dx$

$\displaystyle =\int_a^c f(x)dx+\int_c^b f(x)dx$

[C]

$n$ が奇数のとき

$\displaystyle\int_{-a}^{a} x^n\,dx=0$

$n$ が偶数のとき

$\displaystyle\int_{-a}^{a} x^n\,dx=2\int_{0}^{a} x^n\,dx$